

2011 Differentiated Instruction Institute:
"Just Right—Right Now"—Across the Spectrum

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The Empty Desk: Why We Lose At-Risk Learners and How Brain-Compatible Teaching Can Help



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WHO ARE THE AT-RISK?

Students in poverty?

RACIAL/ETHNIC MINORITIES

The "good ole" average student

Gifted Students?

Females? Males?

Special Education students?

Indicators of disenfranchisement from school:

- Failing grades
- Poor attendance
- Discipline problems
- Isolation from peers
- Attention getting behaviors
- Sleeping in class



Instruction for at-risk students is a failure because...

The divorce between critical thinking and basic skills widens the gap;

Students are robbed of interesting, stimulating assignments (a preponderance of worksheets, seatwork);



Interaction with teachers and peers is reduced because of rote learning methods;

Intensive instruction confining students to a passive role encourages "learned helplessness";

Sorting students into alike groups reduces cognitive involvement.

Barbara Prasseisen "At-Risk Students and Thinking" 1988.

"If mild stress becomes chronic, the unrelenting cascade of cortisol triggers genetic actions that begin to sever synaptic connections and cause dendrites to atrophy and cells to die; eventually, the hippocampus can end up physically shriveled, like a raisin."
Ratey, 2008 (p. 74)

Prenatal rats whose mothers are subjected to repeated stress grow up to have lower stress thresholds.

People with low self-esteem have lower stress thresholds (although scientists aren't sure which condition precedes the other.)

Persons without a sense of control and no social support have increased levels of stress.

**Our test today
is on the
Montillation of Traxoline...**

**"At-risk students represent the
threat of the failure of
democratic society itself. . . .
This population is without a
vision of the American dream.**

Barbara Presseisen "At-Risk Students and Thinking," 1988.



5, 4, 3, 2, 1, (0)

Helping *all* students
achieve in preparation
for citizenship in a
shrinking global world?



Source:

Life and Career Skills

- Flexibility & Adaptability
- Initiative & Self-Direction
- Social & Cross-Cultural Skills
- Productivity & Accountability
- Leadership & Responsibility

Skills Critical to success in the 21st Century

Source: techLEARNING, Nov. 15, 2006

Workforce Readiness Report Card for New Entrants to Workforce

"Must have" skills of
new entrants and
percent of perceived
deficiency in workforce
entrants with high
school diploma.

Deficiency	%
Written Communications	80.9%
Professionalism/Work Ethic	70.3%
Critical Thinking/Problem-Solving	69.6%
Oral Communications	52.7%
Ethics/Social Responsibility	44.1%
Reading Comprehension	38.4%
Teamwork/Collaboration	34.6%
Diversity	27.9%
Information Technology Application	21.5%
English Language	21.0%

Learning and Innovation Skills

are being recognized as the skills that separate students who are prepared for increasingly complex life and work environments in the 21st century, and those who are not.

<http://www.21stcenturyskills.org/route21/>

The four missing Cs...

Creativity

Critical thinking

Communication

Collaboration

A focus on creativity, critical thinking, communication and collaboration is essential to prepare students for the future.

<http://www.21stcenturyskills.org/route21/>

Environment Changes the Brain



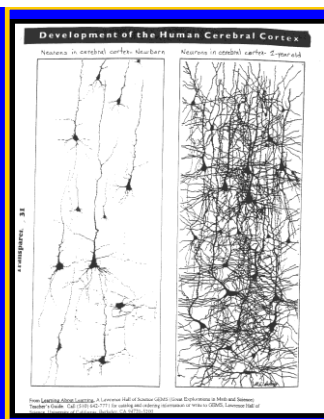
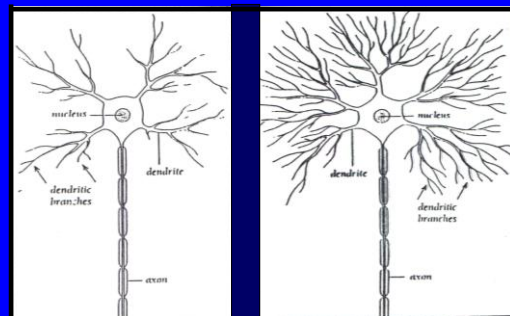
Enriched environments

- increased cell weight
- increased branching of dendrites
- more synapses



Impoverished environments

- decrease in cell weight,
- possible loss of cells,
- diminished synapses



Neurons that fire together, wire together."

Pat Wolfe via Bob Sylwester

LTP Long Term Potentiation— the process of connections in the brain becoming more permanent (learning.)

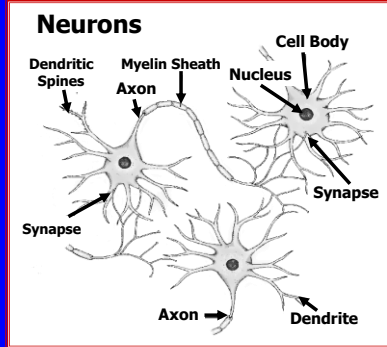
The more permanent the connection the greater the myelination.

The second time a synapse fires, it takes less neurotransmitter (and so on...)

Our brains myelinate from back to front and inside to outside (according to how we survive.)



The brain is composed of over 100 billion brain cells (neurons) which communicate at junctures called synapses.



The very last part of the brain to be pruned ...is the prefrontal cortex, home of the so-called executive functions —*planning, setting priorities, organizing thoughts, suppressing impulses, weighing the consequences of one's actions.*



Discover Magazine
May 2004

What inhibits
synaptic
growth?

What goes on inside the classroom can make or break the lives of struggling learners.



**WHAT INHIBITS
LEARNING?**

(And Growth of Synapses)

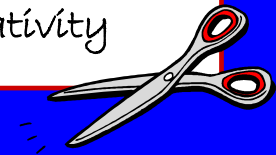
Fear of
failure

Anxiety

Sustained Stress

Threat

Threats Undercut the
Brain's Optimum
Thinking and
Creativity



Under perceived threat the brain...

- Loses ability to take in subtle clues from the environment

- Reverts to the familiar "tried and true" behaviors

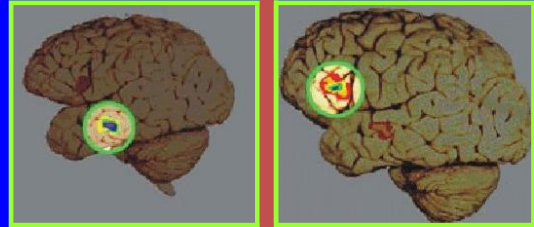
- Is less able to do the 'higher order' thinking skills

- Loses some memory capacity

- Tends to over-react to stimuli — in an almost "phobic" way



Emotions and the Adolescent Brain



The Amygdala plays a major role in instinctive emotional reactions and takes precedence over thoughtful reflection. It matures before the frontal lobes and results in adolescents responding with gut reaction rather than reason which may account for impulsive and risky behavior of adolescents.

Flight or Fight Response

The amygdala asks if a stimuli is potentially dangerous, hurtful, joyful, something to be avoided, etc.



If the answer is yes, chemical messages are sent out through the nerves of the automatic nervous system:

- Gut, heart, blood vessels, lungs, and sweat and salivary glands are automatically activated
- Skeletal muscles are activated
- Digestive and immune systems are de-activated
- The brainstem releases noradreneline throughout the brain which increases alertness so a strong emotion can stamp the memory with extra vividness.



"If mild stress becomes chronic, the unrelenting cascade of cortisol triggers genetic actions that begin to sever synaptic connections and cause dendrites to atrophy and cells to die; eventually, the hippocampus can end up physically shriveled, like a raisin." Ratey, 2008 (p. 74)

Prenatal rats whose mothers are subjected to repeated stress grow up to have lower stress thresholds.

People with low self-esteem have lower stress thresholds (although scientists aren't sure which condition precedes the other.)

Persons without a sense of control and no social support have increased levels of stress.

Students remember content when teachers use emotional hooks.



Emotional Amplitude



Improving thinking through interpretation of graphs, tables and figures.

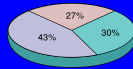
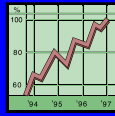


Diagram Survey Strategy

Directions:

1. Look at the diagrams, pictures or tables. Read the captions.
2. For each diagram listed in the chart, write one thing you understand about the figure. Then, write one question you have about the figure.
3. Leave the last column blank for now.
4. Use complete sentences

Figure number	One thing I understand	One question I have	The answer to my question
Figure 1.4			
Figure 2.1			
Figure 2.2			

Windows of Opportunity

Windows of Opportunity As a Child's Brain Matures

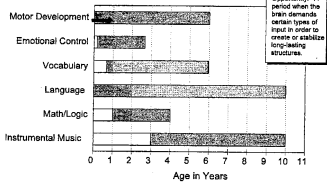


Figure 1.4 The chart shows some of the sensitive periods for learning.

Figure source: David Sousa, *How the Brain Learns*, 2nd ed.

What does the reader learn from this figure?

Diagram Survey

Directions:

1. Look at the diagrams, pictures or tables. Read the captions.
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Figure number	One thing I understand	One question I have	The answer to my question
Figure 1.4	The first three years of life are very important for building emotional control	Can we "teach" emotional control if we get the students earlier?	
Figure 2.1			
Figure 2.2			

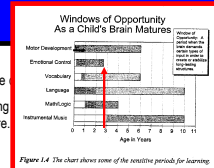


Figure 1.4 The chart shows some of the sensitive periods for learning.

One thing I understand about this illustration...

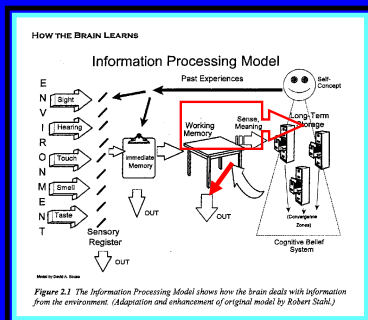


Figure 2.1 The Information Processing Model shows how the brain deals with information from the environment. (Adaptation and enhancement of original model by Robert Stahl.)

Figure source: David Sousa, *How the Brain Learns*, 2nd ed.

What are the implications for students learning new content?

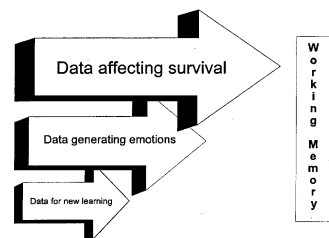
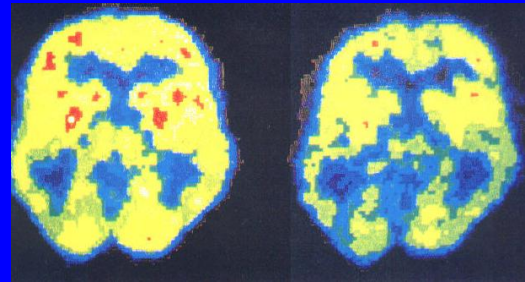


Figure 2.2 Data that affect survival and data that generate emotions are processed ahead of data for new cognitive learning.

Figure source: David Sousa, *How the Brain Learns*, 2nd ed.

Intensity of stimuli



A demonstration of mental processes in the brain...

Specific "tasks" activate the brain in different ways.

Procedural Memory

Declarative (Semantic) Memory

Stroop Effect

Red blue green yellow orange



MacLeod, C. M. (1991). John Ridley Stroop: Creator of a landmark cognitive task. *Canadian Psychology*, 32, 523-524.

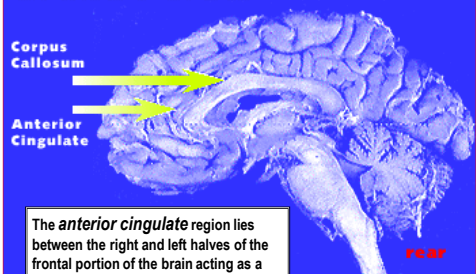
Is there a shift in the brain when students are asked to think?

Stroop Effect

Moving from automatic responses to "reasoned" responses.



Mid-section of the Brain



The *anterior cingulate* region lies between the right and left halves of the frontal portion of the brain acting as a conduit between lower, more impulse-driven brain regions and higher, more rationally-driven behaviors.

Source: NOVA, PBS, 2000

Yes, to efficiency!

No, to habituation!

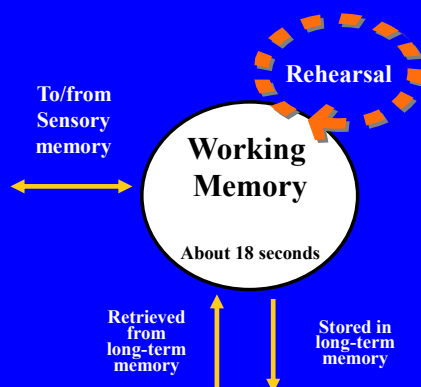
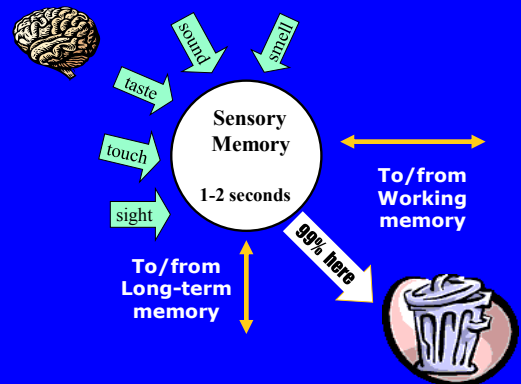
Procedural Memory → Just Do It!

Episodic Memory → Location, Location, Location!

Declarative Memory → Jeopardy Contestant

Why don't students remember the information teachers present to them?

Information on the brain and memory will help answer that question.



Attention!!

Anything that captures student's attention and gets their minds engaged has the potential to produce learning.

The opposite is also true...

No attention

No engagement

No learning

Rehearsal



Rehearsal—getting from working memory to long-term memory

Two kinds of rehearsal...



Rote - deliberate, continuous repetition of material in the same form in which it entered working memory.

Elaborate—integrating information, chunking for meaning, attaching images to the information to be learned.



OPTIMAL USE OF TIME



**IT'S ALL IN THE DESIGN—
LESSON DESIGN THAT IS!**

How long is best for focused activity?

**The age of the learner
plus two minutes.**



Young learners: 5-10 minutes

Adolescents: 15-20 minutes

Adults: about 20-25

The brain prefers a
"pulse" learning pattern.

Focused

Diffused

Focused

Diffused

Focused

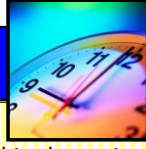
Best learning occurs when interrupted by breaks of 2-5 minutes for diffusion or processing.

Lesson Design 101

Design instruction so students change learning "states" according to age plus/minus two minutes through out the class period.

- Heather's story
- New social studies teacher's testimonial
- 9th grade classes

Students can tune in
for greater lengths
of time when...



- they are highly engaged
- they are deeply interested in the topic
- they have significant prior knowledge that generates sustained "aha" connections



**Your school may
have isolated
classes where
brain-friendly
practices occur...**

**but don't all
students deserve
these opportunities
to learn and grow.**

**"The most extraordinary thing about a really good teacher is
that he or she transcends accepted educational methods."**

Margaret Mead

**"A teacher
affects eternity;
she can never tell
where her
influence stops."**

Henry Adams



"To teach is to learn."

Japanese Proverb